APRIL 1966
VOL. 31 NO. 9

# Soil Conservation

DEVOTED TO THE WISE USE OF LAND AND WATER RESOURCES

SOIL CONSERVATION IN MANY LANDS
Brazil—Nicaragua—Chile
Pages 196, 197, 207

Croplands
Pages 210, 216

Grass Farming
Pages 198, 200, 204

SOIL CONSERVATION SERVICE U. S. DEPARTMENT OF AGRICULTURE

## *Pan American . . .*

Soil conservation gains as an international profession with the convening of the First Pan American Soil Conservation Congress (p. 209).

The exchange through the years of ideas and experiences by SCS conservationists and their counterparts in other lands has built a mutual interest among people and a body of knowledge about resources that transcends national boundaries.

Joao Abramides Neto as general coordinator of the Congress in Brazil and SCS's Roy Hockensmith in the United States give form to this development in the program they have arranged at Sao Paulo.

**Action:** Through Fred Prange, assistant to the administrator for foreign operations, we obtained firsthand accounts of our two action projects in the Americas: From Dirk van de Voet in Brazil (p. 196) and Gerald M. Darby in Nicaragua (p. 197).

These efforts illustrate the kind of technical service SCS offers other governments through arrangements Prange explains in his opening article (p. 195).

**Grass:** While conservation in many countries concentrates on cropland to bolster desperately needed food production, current emphasis in the U.S. is on extending grassland agriculture.

Significant grass-growing experiences are reported from Oklahoma by SCS Agronomist Maurice Gamble (p. 198) and from Indiana by Prof. Maurice Heath (p. 200).

**COVER: A Puerto Rican farmer and an SCS conservationist together survey their joint handiwork, a pond nestled safely between contoured slopes.**


# Soil Conservation

**Devoted to the wise use of land and water resources**

**APRIL 1966** **VOL. 31, NO. 9**



**195** **Foreign Aid in Soil Conservation**
*By Frederick A. Prange*

**196** **Frontier Survey Seeks New Areas for Settlement in Brazil**
*By Dirk van der Voet*

**197** **Nicaragua Improves Its Livestock Industry With SCS Aid**
*By Gerald M. Darby*

**198** **Bermudagrass in Oklahoma**
Lowly pasture grass rises to key role in agriculture
*By M. D. Gamble*

**200** **Indiana Forage Farm**
Pasture research seeks profitable farming system
*By Maurice E. Heath*

**202** **Conservation Practices Mark Indian Lands Across Oklahoma**
*By Edward J. Anderson*

**204** **Six Steps to Good Pastures**
*By B. D. Blakely*

**207** **Soil Conservation in Chile**
Trees and cover crops bring new life to Fundo Chequen
*By Carlos Crovetto Lamarca*

**209** **First Pan American Soil Conservation Congress**

**210** **Narrow Strips Find Favor With Tobacco Farmers**
*By Dentis A. Colson*

**212** **Full Employment for Resources**
*By Orville L. Freeman*

**212** **NACD for Broader Action**

**213** **Profile**
Elmer E. Peterson, Oregon

**214** **Review**
Soil Fertility and Fertilizers; New Publications

**215** **From the Administrator**
World Food and Soil Conservation

**216** **Rough Tillage for Wheatland**



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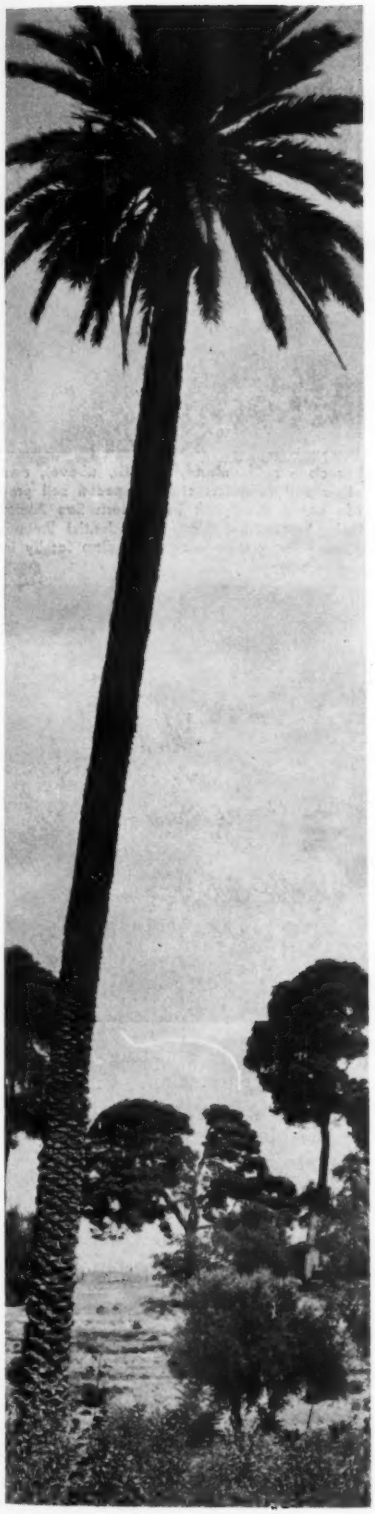


# Foreign Aid in Soil Conservation

**By Frederick A. Prange**
*Assistant to the Administrator, SCS*

THE full technical resources of the Soil Conservation Service are made available to advance soil conservation and resource development outside the United States under a new type of international aid agreement now in effect with five countries.

Under the plan, the Soil Conservation Service provides technical assistance to specific projects in much the same way that it does to soil conservation districts or small watershed projects in the United States.

SCS assigns technical personnel to each project according to needs as the work progresses. The assigned personnel have the full technical and administrative support of the Soil Conservation Service while in the participating countries the same as when helping land owners and users at home.

The Participating Agency Service Agreements are three-way arrangements between (1) the Soil Conservation Service and International Agricultural Development Service (IADS), U. S. Department of Agriculture, (2) U. S. Agency for International Development (AID), and (3) the participating country. SCS personnel usually are members of a team of experts from several agencies, universities, or other organizations.

SCS has such agreements for projects in Brazil, Nicaragua, Nigeria, Tunisia, and Thailand. The assistance is a part of the United States' aid program for developing countries. It is intended to help keep food production in balance with increasing population by improved husbandry of farmlands.

**Apricot seedlings grow at the base of a palm tree in a plant nursery established with SCS assistance at Al Asnam as a part of the conservation program in Nigeria.**

## Food and people

The Food and Agriculture Organization of the United Nations has proposed that world food production be increased by 4 percent a year for the next 15 years. FAO states that such increases are necessary to improve the diet of a half billion people suffering from malnutrition and a billion others who are underfed. The farmlands of the world must provide for an additional 60 million mouths each year. Latin America shares heavily in this unbalance between food and people.

The Soil Conservation Service has been providing technical training and conservation information to developing countries for more than 25 years. By training of specialists and students who come to the United States to learn new methods, SCS has provided a nucleus of trained people for conservation activities in other countries. In addition professional people have gone to other countries and helped in analyzing soil and water

*(Continued on p. 206)*

# Frontier Survey Seeks New Areas for Settlement in Brazil

by **Dirk van der Voet**
*Soil Scientist, SCS, on foreign assignment, Rio de Janiero, Brazil*

THE Soil Conservation Service now has two soil scientists in Brazil participating in the Frontier Resources Survey Project of that country under an agreement with the International Agricultural Development Service (IADS), and the Agency for International Development (AID). Others have spent short periods on the project, and still others are expected to participate later.

The basic purpose of the Frontier Resources Survey Project is to determine the extent and location of relatively unsettled land areas in Brazil which could provide land resources and economic opportunity for several million people from areas of excess population.

An exploratory soil survey map and general report are being made for the western two-thirds of Brazil. Based on this, broad areas can be indicated as generally suitable for settlement. To further confirm and more accurately identify land suitable for settlement, "reconnaissance surveys" will be carried out to delineate areas totaling 50 to 75 million acres.

The Soil Conservation Service is supporting the project under a Participating Agency Service Agreement with AID, the International Agricultural Development Service of USDA, and the government of Brazil.

In the fall of 1963 and summer of 1964 Roy Hockensmith, director of soil survey operations, SCS, made trips to Brazil to lay the groundwork for the project.

Dr. Guy Smith, director of soil survey investigations, SCS, spent several weeks in 1964 in Brazil working on soil classification.

The two soil scientists now in Brazil are on 2-year assignments working full time on the project. Francis W. Cleveland, formerly assistant State soil scientist for Illinois, is assisting with soil interpretations. The author, formerly assistant State soil scientist for New Hampshire, is assisting in aerial photo interpretation. In addition they are giving overall assistance in the planning and operations of the project.

The project agreement calls for additional support visits of 1 to 3 months' duration from soil scientists of the Washington staff.

A. C. Orvedal, chief, world soil geography unit, SCS, was in Brazil for 2 months in 1965. He gave advice and assistance in the preparation of a legend for the exploratory map and guidelines for developing the first approximation of the exploratory map.

*(Continued on p. 206)*

Francis W. Cleveland, SCS (l., above), and other soil scientists study exposed soil profile along roadbank in western Sao Paulo. Italo Falesi, Brazilian soil scientist (below) pauses for a visit with an Indian family in western Brazil.

The soils expedition refuels at a construction camp of the National Department of Highways along the only road through the tropical rain forest to western Brazil.

Checking out native legumes for trial and seed increase is part of the job for SCS Agronomist Gerald Darby (l.) shown with Mario Latino, kneeling, and Ernesto Ruiz of the Nicaragua Ministry of Agriculture. They are inspecting a properly grazed African stargrass pasture.

# Nicaragua Improves Its Livestock Industry With SCS Technical Aid

**By Gerald M. Darby**
*Agronomist, SCS, on foreign assignment, Managua, Nicaragua*

IMPROVED PASTURE development and management combined with better selection and culling of animals are moving the Nicaraguan livestock industry on its way toward the country's goal of adequate beef and dairy products for its growing population.

The United States is helping through a Participating Agency Service Agreement between the Soil Conservation Service and International Agricultural Development Service of USDA, the Agency for International Development, and the Nicaraguan government. Under this agreement SCS provides the services of a specialist in pasture and forage management. That is my assignment in Nicaragua.

Nicaragua depends on cotton, coffee, livestock products, and sugar exports (in that order) for a large share of its foreign exchange earnings. Unstable world prices for coffee and cotton have caused annual earnings to fluctuate widely. It is hoped that an expanded livestock industry will help stabilize the economy.

An important part of the program is to provide adequate forage throughout the year. This is difficult because Nicaragua has a 4- to 6-months' dry period, roughly December through May, when pastures make little growth. The problem is critical in western Nicaragua where people and livestock are concentrated.

Forage production can be increased by establishing more pastures of high-producing grasses and practicing proper grazing, better weed and brush control, rotation of grazing, proper distribution of adequate water facilities, fertilizing, and elimination of pasture burning. Once sufficient forage is produced for a year-long supply, it can be held for winter use as silage, hay, or dry pasture.

The AID program is providing training in pasture management for agricultural technicians of the Ministry of Agriculture, the National Bank, the Agrarian Reform Institute, and the National Development Institute of Nicaragua. It also is helping with livestock and pasture management demonstrations.

The Agency for International Development and the International Development Bank have provided more than $10 million of credit for the program. The money is re-

Mario Latino and Ernesto Ruiz look over a plot of Napiergrass located at La Calera Research Station, Managua, Nicaragua.

loaned through regular banking agencies to farmers and ranchers for establishing pasture, developing water supplies, building silos, and fencing for rotation of grazing.

Improved cattle breeds have been imported and an active program of artificial insemination is underway.

Grasses which are doing well in one part of Nicaragua are being established in other sections of the country for trial and propagation.

The La Calera Research Station of Nicaragua is being assisted with collection of native legume seed and with pasture fertilizer trials.

As a part of the total national program, farmers and ranchers are being informed of the harmful effects of fire on pastures, croplands, and forests.

In this way, Nicaragua is laying a foundation for an expanded livestock industry. ♦

# Bermudagrass in Oklahoma

## A lowly pasture grass rises to key role in conservation agriculture of the South

**By M. D. Gamble**
*Conservation Agronomist, SCS, Stillwater, Okla.*

A LOWLY creeping grass, once feared as a pest, has won its way in half a century to a position as a major crop in conservation farming systems in Oklahoma.

Bermudagrass is now welcomed and grown successfully on farms in every part of the State, except in the High Plains. The history of bermudagrass in Oklahoma mirrors the evolution of grassland agriculture in a region once dependent on row crops.

The present widespread use of bermudagrass in Oklahoma stems from a small planting from seed at the Oklahoma Agricultural Experiment Station in 1892. The few plants that survived that winter were called "hardy" bermudagrass.

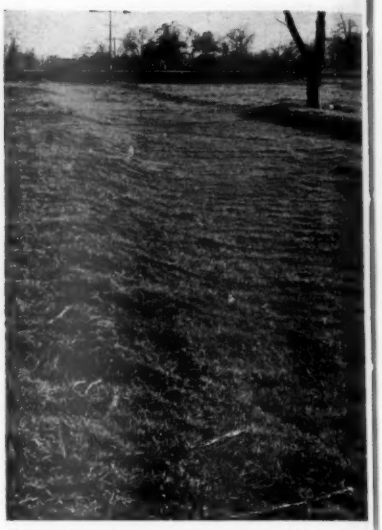
### Trial in every county

John Fields, director of the station, in 1902 began a long crusade for recognition and use of bermudagrass in Oklahoma. During the years 1904 and 1905 he supplied at least one farmer in each of Oklahoma's 77 counties with enough rootstocks for a trial planting. By 1907 bermudagrass had made its appearance in every county in the State, including the Panhandle counties with their higher elevations and semiarid climate.

Farmers who made these trials were generally well pleased but some were fearful that the vigorous grass would overrun their entire farms, which at that time were mostly in row crops.

During this period of introduction, the State was favored by above-normal rainfall, except the years 1909 to 1911, when dry summers and cold winters eliminated bermudagrass from the Panhandle and most of western Oklahoma.

From these early plantings bermudagrass thrived throughout the eastern half of Oklahoma. It is reported that in 1910 Lincoln County, in central Oklahoma, sodded 798 acres, bringing its total acreage to 1,372. Today bermudagrass pastures in the Lincoln County Soil and Water Conservation District exceed 40,000 acres.

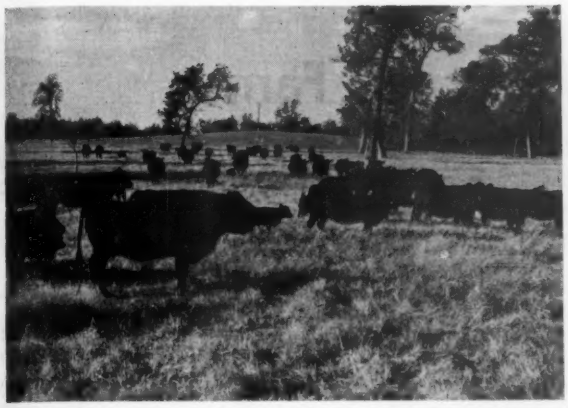


**This bermudagrass waterway planted in 1938 is still carrying water from 80 acres on a farm in the Stephens County Soil Conservation District, Okla.**

Bermudagrass is now being planted in the State at the rate of more than 190,000 acres annually. Presently, more than 2½ million acres control erosion and furnish valuable forage for Oklahoma's expanding livestock industry. It has been predicted that the acreage will reach about 5 million.

There are many ways of planting bermudagrass rootstocks. In the early days planting was done by hand. The sprigs or sod chunks were dropped a few feet apart in furrows and covered by using any suitable farm equipment that was available.

**The widespread planting of bermudagrass was made practical by the invention of mechanical planters to place the rootstocks in the soil and cover them. One of the first (l.) was a horse-drawn outfit that required a second operator to drop the sprigs through a chute. A modern planter mounted on a tractor (r.) requires only one operator.**



**Bermudagrass is a major grass in both permanent and rotation pastures in Oklahoma. Midland bermudagrass and clover (l.) make productive pasture on cleared bottom land in the Johnson County SCD. Corn planted in a bermuda sod (r.) produced a bumper crop in the Gaines Creek District.**

In 1910 one farmer reported that he planted his bermudagrass while driving a wagon across a prepared seedbed dropping the sprigs in the ruts made by the front wheels and pressing them into the ground with the rear wheels.

These methods, although effective, were too slow to be practical for large scale plantings and farmers started using manure spreaders to scatter the roots on a prepared seedbed to be cut in with a disk and cultipacked. It was not uncommon to interplant the grass with corn, and it was found that cultivation aided growth.

The Emergency Conservation Work in the early thirties brought widespread establishment of bermudagrass for pasture and erosion control in Oklahoma.

### Automatic planter

Many innovations were devised to speed up the planting. All were more or less effective, but it was not until 1949 that an automatic bermudagrass planter designed by the Soil Conservation Service was placed in commercial production. Today a number of companies are manufacturing planting equipment that is shipped to all parts of the country where bermudagrass is grown. Although made primarily for field plantings, this equipment is suitable for planting bermudagrass on watershed structures and on highway cuts and fills.

Highway officials in recent years have given increased attention to the establishment and maintenance of a protective cover of bermudagrass on highway shoulders and cuts. On the 88-mile Will Rogers Turnpike in northeastern Oklahoma, for example, about 1,850 acres of bermudagrass was established and is being maintained for roadside stabilization and beautification.

The soil-conserving ability of bermudagrass has been proved by many years of research. At the Agricultural Research Service Hydraulic Laboratory at Stillwater, Okla., bermudagrass was outstanding as vegetation for protection of waterways, being able to withstand a velocity of 8 feet per second on 10 percent slopes.

Today many thousand bermudagrass waterways are safely channeling excess water from terraced fields. It is also used to stablize dams and spillways on thousands of farm ponds and hundreds of floodwater detention structures.

Since the advent in 1950 of equipment for seeding into sod, bermudagrass pastures in eastern Oklahoma are being overplanted with cool season small grains and legumes to furnish additional grazing. The residual effects of fertil-

**A heavy tractor on the level berm of a floodwater-retarding structure steadies a bermudagrass planter on the steep slope below by means of a cable connecting the two pieces of equipment.**

izer and legumes increase the quality and quantity of the succeeding years' yield of grass.

Today there are a number of improved varieties of bermudagrass being planted in Oklahoma. Coastal bermudagrass, a development of the Georgia Coastal Plains Experiment Station, is the predominant variety in the southeastern part of the State, where it is well adapted to the forested coastal plains soils.

Another variety developed from a first generation hybrid of Coastal bermudagrass, and a hardy Indiana strain was brought to Oklahoma in 1949 for testing. This variety was found to be more tolerant of cold and drought than Coastal bermudagrass and was released cooperatively by the Oklahoma Agricultural Experiment Station and Georgia Coastal Plains Experiment Station, as Midland bermudagrass. It is well adapted to Oklahoma conditions, and most of the acreage now being planted is of this variety.

In 1954 the Oklahoma Experiment Station released rootstocks of a new variety of common bermudgrass named Greenfield in honor of John Fields, an early director of the station. Many farmers and livestockmen like Greenfield, and sizeable acreages of this variety also are being planted.

Once it was thought that bermudagrass was adapted only to the higher rainfall areas of eastern Oklahoma, but now it is being widely planted in drier sections on adapted soils where there is a favorable soil-moisture relationship. Bermudagrass is also being used in irrigated pastures on many farms.

General and widespread acceptance of bermudagrass attests to its value as a conservation crop of high value for forage production and for soil protection and improvement. Today many farmers are using bermudagrass as a major crop in a conservation cropping system. ♦

# Indiana Forage Farm

## Pasture research seeks profitable farming system for livestock-woodland area

**By Maurice E. Heath**
*Associate Professor of Agronomy, Purdue University, Lafayette, Ind.*

RESEARCH on soil and climatic problems of the unglaciated sandstone-shale region of southern Indiana is opening the way to a more profitable use of land in the area. As the studies bring to light crop adaptations and improved cultural practices, new and superior alternatives with less risk become available.

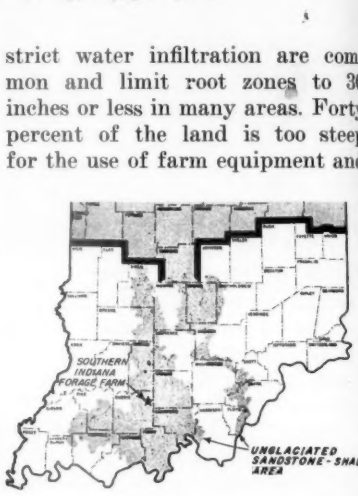
The research studies started in 1949, when an interdepartmental committee at Purdue University's Agricultural Experiment Station was asked to study how some of the low-income areas of southern Indiana could be made more profitable. The sandstone-shale soil region was chosen because it was considered to have one of the lowest per-acre incomes.

In 1952 farmers and industries from the 41 southern Indiana counties raised funds to purchase 11 farms comprising 1,016 acres in northeast Dubois County, at an average cost of $40 an acre. In 1953 the land was given to Purdue University for research purposes and became known as the Southern Indiana Forage Farm.

### Type of land

The region is deeply cut with drainageways. The topography is rolling to steeply rolling. A thin mantle of loess ranging from a few inches to as much as several feet thick covers the area. Without protective vegetative cover the soils erode very easily.

Impervious soil layers that restrict water infiltration are common and limit root zones to 30 inches or less in many areas. Forty percent of the land is too steep for the use of farm equipment and




Scrub woods covered about 40 percent of the Forage Farm when it was purchased.

Photos were taken by the Indiana Agricultural Experiment Station, Lafayette, Ind.

is in woodland. Initial soil tests showed available phosphorus and nitrogen to be very low but available potassium to be in fair supply.

The major part of the Forage Farm is in land capability classes II, IV, and VII with more than half the acreage in classes IV and VII.

Southern Indiana receives 40 to 46 inches of rainfall annually, with more than a month of summer drought to be expected 8 years out of 10. Winter temperatures fluctuate frequently above and below freezing with little, if any, snow cover. Soils are commonly waterlogged in winter and extremely dry during summer droughts.

### Research objectives

The purpose on the Forage Farm is to study how to intensify a forage-livestock-woodland type of agriculture. The research deals with problems of forage establishment and production; measurement of animal response from forages that can best be grown; woodland management; development of adequate supplies of potable water for home and grade-A dairy use; irrigation potentials; and other resource problems such as alternative uses of land and water for recreation, wildlife, and fish production. The research deals only with problems peculiar to the area.

### Production problems

The first 4 years were a period of intense land and facility development. Hillside gullies were sloped, scrub and small trees cleared, soil treatments and forage seedings made. Pasture fields and woodland areas were fenced. Sixteen farm ponds were built to provide water for livestock in pasture fields and facilities for water and fish research.

Based on previous limited small plot trials in southern Indiana, alfalfa was chosen as the base legume.

Fifty acres were seeded to a 50-50 alfalfa-grass mixture in 1956.

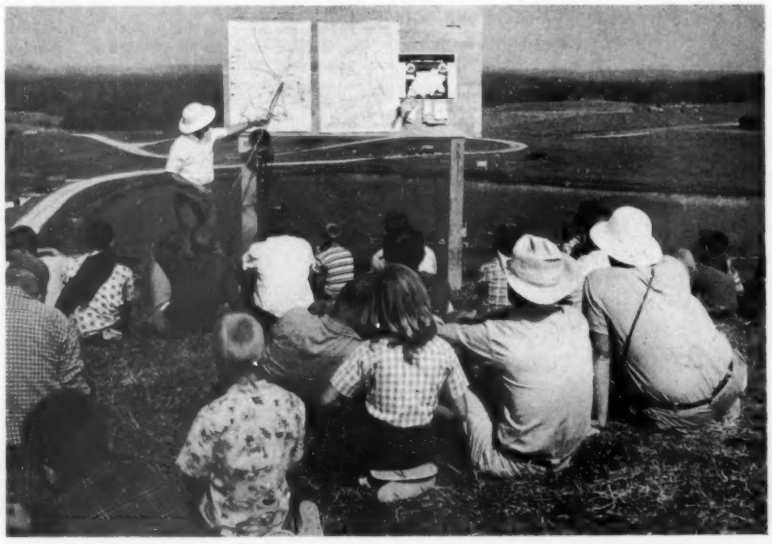
**Cattle graze in winter on aftermath and round bales of tall fescue on field cleared of woods after the Forage Farm was purchased.**

It was soon found that, with soils waterlogged in winter, alfalfa suffered excessively from heaving from frost, especially if grazed. In 1958, following the first year of grazing, 98 percent of the alfalfa had disappeared. Alfalfa stands for hay continue to thin from heaving and usually need reseeding after the third harvest year.

### Year-round pasture

Five years of research with beef cows and calves showed that stock over-wintered outdoors performed as well or better than that having shelter. These results suggested

**Field days and tours on the Forage Farm give specialists an opportunity to explain the potentialities of community development in the area.**



the practicality of an all-winter pasture program for beef cows in the area.

Excellent winter pasture results were obtained with tall fescue. After seed harvest in June, the hay is cut and dropped in round bales in the field. Aftermath and bales are then available for winter grazing. Rationing winter pasture with an electric fence to give stock access at one time to what they will clean up in a month has increased the days of grazing 57 percent over free-choice grazing.

Reed canarygrass on low land subject to flooding has shown promise for midsummer drought pasture.

### Water from farm ponds

Drilled wells on upland farms in the sandstone-shale soil region are usually of very low yield. Farm ponds however hold water well if properly located. Pond water at the forage farm has provided an abundant and dependable supply of potable water where a slow sand or diatomaceous earth-type filter is used with chlorination.

### Low-risk crops

Research and development on the forage farm have shown what low-risk crop and culture alternatives are available to the hill farmers of the area. Winter wheat proved to be extremely low risk. Winter vetch, if used for silage can also be grown with the wheat. The new hybrid grain and forage sorghums grown in close 14-inch noncultivated rows tolerate drought stress and qualify as low-risk crops.

Of the perennial grasses tested, tall fescue is unequaled for sod density and ground cover at all levels of fertility. Preliminary results with some of the lateral rooted perennial legumes strongly indicate that they may have a tolerance to heaving that would make their use practical.

Effort is also underway to find new industrial cash crops that will fit the environment of the area. ♦

# Conservation Practices Mark Indian Lands Across Oklahoma

**By Edward J. Anderson**
*Area Land Operations Officer, U. S. Bureau of Indian Affairs, Anadarko, Okla.*

CONSERVATION measures and good management practices on the land are showing up over wide areas of Oklahoma, and some of the better programs of striperopping, cover crops, and grass rotation are evident on land in Indian ownership.

In fact, striperopping on broad fields subject to wind erosion is a distinctive mark of conservation on Indian land. In the peanut producing areas of Oklahoma stripcropping is a required practice.

Widespread, too, is legume rotation which makes for more prosperous and attractive farm units.

Indian reservations were set aside by treaty for use of all members of a tribe occupying the reserved land. In some cases definite tracts were allotted to an individual. Indians still own more than a million acres in Oklahoma and have use of 73,000 additional acres owned by the Federal Government.

Though all these lands are private, they are held in trust by the Federal Government with large acreages operated under lease contracts with individual farmers. Conservation and proper land use are a part of the trust responsibility, for the land represents the Indian citizen's greatest physical resource. Conservation plans are part of the land use contracts

**Arlo Trull, lessee, (above, c.), shows Indian landowners the growth of peanuts made possible with irrigation. Frank Tabbytite, Sr. (below, c.) and son (l.) with neighbor Robert Toquothy fill hopper to make a planting of Midland bermudagrass.**

An interpreter assists a technician with training aids in educational meeting for Indian landowners.

assuring continuous conservation practices.

The Branch of Land Operations of the Bureau of Indian Affairs has program responsibility for conservation, including soil and moisture conservation operations on agricultural lands, irrigation operations on western reservations where irrigation is practiced, agricultural extension, and outdoor recreation, including fish and wildlife.

**Conservation examples**

A good example of conservation-minded Indian landowners is the Frank Tabbytite family, Comanches of Walters, Okla.

Mr. Tabbytite, his wife, and son, Frank, Jr., operate 560 acres of restricted Indian land. In 1957 Tabbytite started a complete conservation program on all the land. He has increased his income on the acreage by 50 percent.

An important part of the Tabbytite operation is the effective use of improved and temporary pastures. In many areas Indian farms stand out as examples of good grassland management.

Irrigation development is another measure that has meant increased income to Indian landowners in southwestern Oklahoma.

Mrs. Thelma Warden Standing and her sister Mrs. Lorene Warden Ross, members of the Wichita Tribe, leased their 320-acre farm to Mr. Arlo Trull through the Bureau of Indian Affairs near Fort Cobb.

Through an irrigation program, crop-share rental to the Indian owners has averaged $6,000 a year. This is approximately six times the average dryland rent of $1,115 previously received on this land.

Irrigation has meant better cash crops, and the growth of cover crops is assured, lessening the hazards of wind erosion in an area of predominantly sandy soils.

In Oklahoma it is required that all Indian acreage grow winter legume crops a minimum of 1 year in 5. Rangelands are used on the basis of management plans consistent with soil and range surveys that recommend patterns of use according to range site and conditions.

Educational meetings are held frequently to inform Indian landowners of conservation farming techniques and to encourage better land use.

Conservation education and the Indians' appreciation for the land combine to make many Indian farms in Oklahoma models of good management practices. ♦

Weeping lovegrass in crop rotation gives protection from wind erosion and helps improve soil.

# Six Steps to Good Pastures

By B. D. Blakely
*Head Conservation Agronomist, SCS*

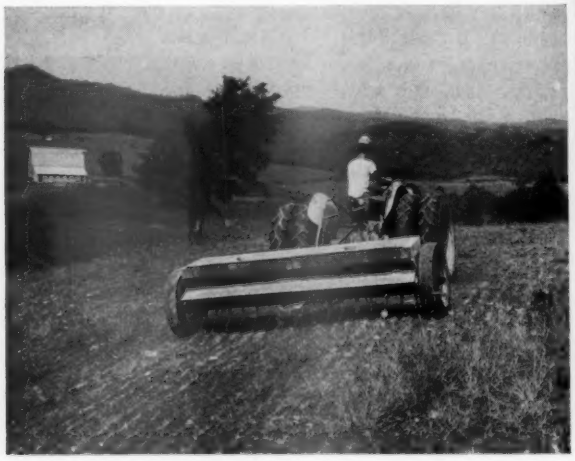
FITTING a year-round forage program to livestock needs is not an easy task on many livestock farms. Yet it is an essential ingredient of conservation planning, for economic forage production is often the key to the total conservation program on livestock farms.

On many soils, especially those that are steep or shallow, a dense sod of pasture grasses makes the best defense against soil erosion and excessive runoff. On these, as on many acres of better arable land, livestock production offers an attractive alternative use.

An economic livestock enterprise requires a sustained high level of forage production that provides ample feed through the year. The six steps to good pastures pictured here help make that possible.

**1. Adapted plants.** Plants that are well adapted to the soil and climate will stay productive longer than species poorly suited to soil conditions. There are many kinds of grasses and legumes that can be used for grazing. Several have special characteristics that make them desirable for certain soil and climatic conditions, such as the pangolagrass and white clover combination used with seepage irrigation (below).

**2. Fertilizer.** Like any other crop, pastures need fertilizers to keep them productive. Have the soil tested to determine the fertility needs at time of seeding. Then maintain vigor and growth by applying fertilizer, especially nitrogen, as needed each year. Applying ground limestone (below) is often the first step in developing an improved pasture in humid areas.

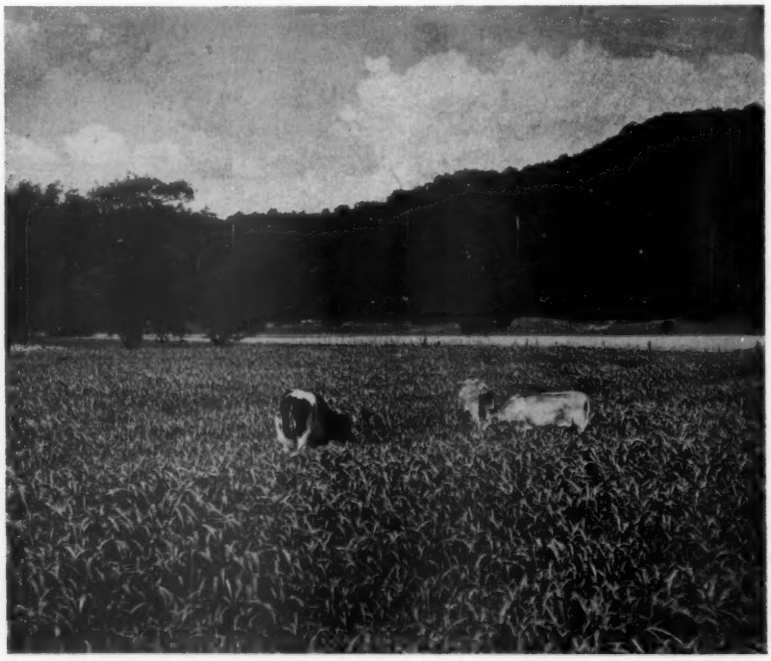


**3. Grazing management.** Proper grazing prolongs the life of the pasture and increases milk and meat production. The growth habits of the different plants determine when and how much to graze. Allow a period for regrowth each year. Even such a vigorous grass as bermudagrass (above) can be overgrazed.

**4. Weed control.** Weeds (below) use water and fertilizer that otherwise could be used by pasture plants. Clip or otherwise control them before they go to seed.

**5. Renovation.** Profitable pastures begin with good stands. Old, thin pastures need to be reseeded to provide an abundance of quality forage. Have a good seedbed, apply fertilizer, and protect from grazing until the stand is established.

**6. Year-round forage.** Plan for enough of the right kinds of pastures to provide enough forage for all seasons, plus some extra. Supplemental annual pastures, such as the sudan below, often can fill gaps when other pastures are not providing enough feed. ♦



## Foreign Aid

*(continued from p. 195)*

problems and planning conservation programs.

Among other items, the programs provide for (1) using land within its capabilities, (2) improving crop and forest management, (3) handling water to protect the land and to irrigate crops, and (4) other applicable soil and water management practices.

Countries from all over the world are showing greater interest in using their natural resources more wisely. Many of them have already taken steps to use their soil and water resources in keeping with the future food and fiber needs of their people.

### Demand for technology

Because of the increased demand by developing countries for agricultural technology, the U. S. Department of Agriculture has recently established an agency to provide this type of assistance. The International Agricultural Development Service works through AID in coordinating technical assistance agreements and in arranging for technicians to service them. The Soil Conservation Service currently is providing technicians for the following projects:

*Brazil*—Two soil scientists are working with a team in the Brazilian Government's Frontier Resources Survey Project. The soil scientists are assisting their counterparts in improving map interpretation and reconnaissance soil mapping of large undeveloped areas.

*Nicaragua*—One SCS agronomist is a member of a USDA team working with Nicaraguan technicians to improve the country's agricultural production with emphasis on grassland improvement and beef production.

*Nigeria*—Four soil conservationists are training Nigerians for leadership in a government soil and water conservation program for northern Nigeria. The Nigerian agriculturists are receiving training in technical subjects of soils, engineering, agronomy, and forestry, and in the supervision and administration of a resource conservation program.

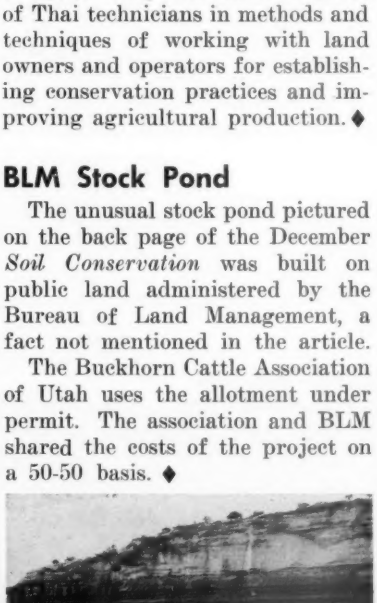
*Tunisia*—Seven SCS technicians are working in the development of the Oued Marguellil watershed. A watershed plan was completed in 1963. Conservation practices and structural works of improvement were started in 1964. The technicians are assisting in detailed planning and application work on the land. At the same time they are training Tunisian technicians so they can assume direction of the program.

*Thailand*—Four SCS technicians are working with the Land Development Division of the Thai government. They will train a number of Thai technicians in methods and techniques of working with land owners and operators for establishing conservation practices and improving agricultural production. ♦

## BLM Stock Pond

The unusual stock pond pictured on the back page of the December *Soil Conservation* was built on public land administered by the Bureau of Land Management, a fact not mentioned in the article.

The Buckhorn Cattle Association of Utah uses the allotment under permit. The association and BLM shared the costs of the project on a 50-50 basis. ♦



## Frontier Survey

*(continued from p. 196)*

As part of the exploratory survey, field parties have been operating in the States of Acre, Goiás, Maranhao, Mato Grosso, Pará, and Piaui, and the Territory of Rondonia.

A Brazilian soil scientist from the Division of Soils and Soil Fertility of the Ministry of Agriculture is working with the author on aerial photo interpretation. The project has procured most of the aerial photo mosaic indices of Brazil that are available. These have been used in the preparation of the exploratory map. The procurement of individual photos is being delayed until areas are designated for reconnaissance survey. A basic training of 7 days' duration in aerial photo interpretation has been given to 42 soil scientist trainees of the project.

Soil interpretation has produced a capability classification system based on six systems of management, ranging from the primitive use of the hoe and machete to use of modern machinery and advanced methods of cultivation and fertilization.

The use of fertilizer in Brazil is made difficult by the great distances from the sources of supply and inadequacy of transportation facilities. It is essential, therefore, that encouragement be given to settlement of the areas with most natural fertility.

Attempts are being made to interpret soil maps according to their potential for the more primitive as well as with advanced types of agriculture. Interpretative tables are being prepared to accompany the exploratory map, listing the dominant soils occurring within the mapping units. These tables list the main limitations and hazards affecting land use and will classify the dominant soils according to their potential under different management systems. ♦

## Soil Conservation in Chile . . .

# Trees and Cover Crops Bring New Life to Soils of Fundo Chequen

**By Carlos Crovetto Lamarca**

*As told to Fred W. Herbert, formerly Assistant State Conservationist, SCS, Berkeley, Calif.*

The author shows the luxuriant growth of Lana vetch on his farm.

OUR RANCH in Chile, operated by my father Tomas Crovetto, my brother, Tomas, Jr., and myself, contains 1,500 acres, about 25 miles from the City of Concepcion.

My father purchased this property in 1945. He was a city-bred man but had a strong love for the land, inherited from his father who was a farmer in Italy. He wanted his sons to take up a farming life.

### 200 years of wheat

The use of the acreage of our farm, "Fundo Chequen," at this time is about as follows: 1,000 acres in "dryland," 100 acres of irrigated pasture, 80 acres in vineyard, 10 acres in orchard (cherries and apples), and 300 acres in pasture and forage. In addition we raise about 5,000 chickens annually. "Dryland" is a term we use for land that cannot be cultivated to any advantage.

On all this land, excepting the vineyard, nothing but wheat had been raised for 200 years. The soil was badly eroded and the fertility very low. Production was at a minimum. Wheat yields were as low as four times the amount of seed planted.

Similar land in the neighborhood has already gone from cattle to sheep. The next step will be goats and then abandonment. This was the situation we were faced with, and we realized that unless something was done, our land was doomed.

My father's first project was to put the thousand acres of dryland into trees. He had a natural "land sense" and recognized that trees represented the only long-term, satisfactory use for this part of the farm. It was class VI and VII land, uneven, with steep slopes in some places, gullied, and most of the topsoil had eroded. The soil that was left is a heavy-textured clay loam. Much of this land was a menace to the tillable acres below.

Monterey pine was selected as the woodland tree because of its proved adaptation to that area. The climate is comparable to that of the coastal valleys of California, such as Napa and Sonoma. The trees were obtained from a government nursery.

### First harvest in 10 years

My father spent 2 years, 1946-47, planting these trees himself, by hand, with a small amount of hired labor. The trees were planted 7 feet apart both ways, about 1,000 trees an acre—a million trees in all.

By 1963 the trees were about 17 inches in diameter breast-high and 50 to 70 feet tall. The plantation has been regularly pruned and thinned. The first thinning was made in about 40 percent of the plantation when it was 10 years old. A second thinning was made several years later.

The thinnings were sold to a pulp mill at Concepcion, and this just about paid for the labor. We also used the wood for charcoal and heating. We ended up with about 300 trees an acre.

We have a small sawmill on the farm, and I have built an 8-room home for myself and seven small homes for workers, all with lumber from our trees. We will begin harvesting timber in about 1968 and will continue to manage the plantation on a sustained yield basis.

Our first step to improve the tillable land was to plant crimson clover. We planted 20 acres in 1955, to be rotated with winter wheat.

The crimson clover was the first legume in the dryland area. It provided excellent grazing, and the yields of wheat began to improve. These steps were an encourage-

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Carlos Crovetto made his first trip to the United States in June 1958 for the purpose of learning about soil and water conservation. Under the auspices of the Soil Conservation Service, he visited areas in Washington, Oregon, and California, to observe and study land management methods.

He returned to Chile in February 1959 and immediately began to put soil and water conservation practices into effect on land that sorely needed rehabilitation. In 1963, he made a second 12-weeks' trip to this country. On this trip he related this account of his farming, the results of his conservation activities, and his expectations for the future.

He was assisted with his itinerary and contacts in this country by the Agency for International Development and the Soil Conservation Service, but he paid all his expenses on both trips.—F.W.H.

A 10-year-old vineyard on a 25 percent slope in the fourth year of nontillage, using blue lupine as a green manure-mulch cover crop. The vines are planted 3 feet apart. Monterey pines are planted in the background. In the picture (l. to r.) are Tomas Crovetto, Jr.; Gustavo Arancibia, soil conservation specialist; and Carlos Crovetto.

ment to go further and led to my desire to learn all I could about modern methods of erosion control and the use of plants for soil conservation for the rest of our farm.

### Mulch and nontillage

On my first trip to the United States, I was chiefly concerned to learn how to stop soil erosion. This was our immediate and vital need. I was alert to soil conservation measures and particularly any that would protect and improve the soil at the same time.

I took a 3-months' course at the California State Polytechnic College at San Luis Obispo in "Crops, Soils, and Range Management." From that course, and more importantly from what I saw in the field with SCS technicians, I was greatly impressed by the nontillage and mulch tillage practices.

Upon my return to Chile, in February 1959, we began on a nontillage program in vineyard, orchard, and rangeland. Our first step was to broadcast blue lupine on 30 acres of rangeland. During the first year, we cut it with a sickle mower and left it on the surface of the soil.

The following year the lupine was much heavier—a fine stand, 3 feet tall and very thick. When we cut the crop in the blossom stage for green manure, we left a row 1 foot wide at 20-foot intervals to mature for reseeding. We repeated this 1 more year, 3 years in all.

At the end of the third year we tilled with a rotary tiller, working the mulch into the surface of the soil enough to provide a seedbed. We then fertilized with 400 pounds an acre of 16-20-0, and seeded 15 pounds of Lana vetch (inoculated) and 80 pounds of oats an acre.

On this field we made three cuttings of vetch a year, two green cuttings, the last one dry for seed. On the 30 acres we produced 75 tons, dry weight, of forage. Lana vetch makes excellent feed for cattle and hogs. The seed is especially good for chickens.

Our best practice with Lana vetch is to sow it after establishing a mulch and working the mulch at the surface of the soil, with very light tillage. Lana vetch produced over twice as much hay as crimson clover, which was our next best legume.

### Vineyard improves

After 4 years of nontillage in our vineyard, using blue lupine as a green manure mulch, our production is improving, and there is absolutely no soil loss. Our prunings are cut in small pieces and left on the surface.

Other vineyards in the neighborhood are declining in production and are suffering from soil erosion. The only exceptions to declining yields are where increasingly large amounts of fertilizer are being used. But with soil losses continuing, they are faced with going out of production.

In conclusion, I would say that I have observed and carefully studied the many soil and water conservation practices in the United States, including contouring, stripcropping, terracing, the building of stock ponds, reservoirs, range and forestry conservation, and the complete watershed pro-

Blue lupine in its second year on a once-bare, badly eroded clay loam soil, stands 3 feet high.

tection program.

From my knowledge of our own land in Chile, I am convinced that what we need now, most of all, are the simplest soil protecting and improving practices. They are the easiest to apply and are fundamental:

First of all, to use the land according to its condition and need. In our case, trees for two-thirds of the farm is an example.

Secondly, improve the soil by the simple practice of growing legumes, along with grasses, and using these for mulching, green manure, and soil protection, as well as for grazing and hay. Erosion is stopped, the soil structure improved, water penetration made easier, and fertility increased.

I am also convinced that this program is turning the tide from soil erosion and ultimate abandonment of the land on our farm, to crop and livestock improvement that will bring economic stability. I know that a very large segment of the land in Chile faces the same problems and will require the same remedies.

A few of our neighbors have visited our farm and are impressed by the results obtained so far. Some are beginning to adopt this nontillage, conservation system of farming. I believe that the next few years will further demonstrate the benefits of these measures, and I hope that there will be a spread of influence from this that might usher in a new era of land management in my country. ♦

### Hedges for Great Plains

On the central Great Plains hedges are of special value in protecting small areas from wind, drifting sand, sleet, and snow.

It is generally preferable to plant young trees or shrubs. For most deciduous hedges 1-year-old plants from seed or cuttings are best. Slow-growing species may be 2 or more years old.

## Pan American Congress Reflects Growing Interest in Conservation

THE FIRST Pan American Soil Conservation Congress being held this month in Sao Paulo, Brazil, grew out of the rising interest in soil and water conservation around the world.

There is new awareness that rapidly expanding needs for food can be met by intelligent care and development of land and water resources.

A recent Economic Research Service study of agricultural progress in 26 developing nations gives a picture of the food crisis confronting mankind. The 26 countries — among them the Latin American nations of Argentina, Brazil, Chile, Colombia, Costa Rica, Mexico, and Venezuela—represent three-fourths of the people, food, and income of the less developed lands of the free world.

The ERS study showed that a food deficit equivalent to $6.8 billion will exist in these areas by 1970, despite improvements being made in agricultural production.

### Exchange of ideas

Technicians and scientists in several Pan American countries have discussed for many years the need for a conference at which American nations could exchange data, information, and ideas on resource conservation. The Congress is the outcome of their interest.

Although the Brazilian Government, through the Ministry of Agriculture and the Agriculture Secretary of the State of Sao Paulo, is sponsoring the Congress, several other countries cooperated in planing the program. The Soil Conservation Service has encouraged the undertaking and assisted in arranging the program.

Ten SCS conservationists are attending the Congress.

From the Washington Office: D. A. Williams, administrator; W. R. Van Dersal, deputy administrator; F. A. Prange, assistant to the administrator for international programs; Roy D. Hockensmith, director of Soil Survey Operations; Darnell M. Whitt, director of Plant Sciences Division; John H. Wetzel, assistant deputy administrator for watersheds; and Kenneth M. Kent, head of Central Technical Unit (Hyattsville, Md.).

From the field: J. R. J. Bradshaw, assistant State conservationist, Utah; Laurence D. Giese, State soil scientist, California; and Willie Cumpiano, range conservationist, Puerto Rico.

### Papers for the proceedings

Another 20 SCS people have prepared papers for discussion at the Congress and publication in the Proceedings. Thirty additional papers are included from other United States agencies, along with several from U. S. State universities. Papers also will be presented by scientists and government officials from nearly every other nation in the Western Hemisphere.

In addition to the conference discussions, the Congress includes several social events, and 4 days of technical field tours to view agriculture in the State of Sao Paulo.

The printed Proceedings will be a useful compendium of the many opportunities that modern science and technology offer for resource development to meet the food needs of the countries involved, to improve the welfare of rural people, to increase foreign exchange earnings, and to promote economic growth.—ROY D. HOCKENSMITH, *director, Soil Survey Operations, SCS.*

# Narrow Strips Find Favor With Tobacco Farmers

**By Dentis A. Colson**
*Conservation Agronomist, SCS, Bowling Green, Ky.*

CONSERVATION-MINDED tobacco growers in Kentucky have adapted the practice of stripcropping to the intensive farming methods their crop requires with good results in soil protection and yields.

The main feature of tobacco stripcropping is the use of narrow strips to accommodate the number of tobacco rows best suited to the farmer's operations. Cooperators in soil conservation districts, working with conservation technicians, have generally settled on 6 rows as the best width, although fields of 4- or 8-row strips are common.

Conservation farmers began conducting field trials of narrow-width contour strips for tobacco in 1958. The first trials were made in Russell County, Ky., under the supervision of Noble E. Howard, SCS work unit conservationist, on the farms of O. G. Stephens, Ed Edmonds, and Morris Edmonds.

These studies showed that 4- to 6-row strips usually reduce labor costs the most. The narrow strips also enable the farmer to get maximum use of his machinery.

In 1962, the information gathered from the field studies was put into use throughout the State in conservation planning. Since that time the practice has spread rapidly.

Although this method was first tried with tobacco, it is now being used with good results with corn.

Some of the advantages of narrow contour strips for tobacco are:

(1) The sod strips help maintain soil structure, reduce soil compaction, and improve the workability of the soil.

(2) Narrow strips give near maximum protection from soil erosion. Visual observations indicate that the strips reduce soil loss approximately 50 percent more than does regular contour stripcropping.

(3) Infiltration and water-holding capacity of the soil are increased because of reduced soil compaction.

(4) It is easier to keep the fields smooth. By plowing two strips at the same time ("deadheading" at the ends), the farmer can leave only one open plow furrow along the side of each strip. The strips can be plowed the opposite way the next time, thus helping to keep the strips level.

(5) The land can be prepared for planting tobacco as it is needed, since each strip is a complete field.

(6) Alternate strips of sod allow easier access to all parts of the field to service the farming operation and in hauling the tobacco to the barn.

(7) It is easy to spray the crop for insect control, weed control, and sucker control from the sod strip on each side of the cultivated strip.

(8) It is easier to prime the tobacco when it is grown in narrow strips.

(9) Irrigation equipment is easier to place and to remove, because the sod strips serve as travel lanes. Also, damage to the tobacco leaves can be avoided in this operation.

(10) Tobacco sticks can be distributed directly to the field from the wagon.

(11) The sticks of tobacco can be field-wilted on the sod strips after cutting, without damage from mud if it should rain before the tobacco is housed.

(12) The narrow strips provide better air drainage through the field and under the lower leaves, thus reducing leaf drop.

Recent data from the University of Tennessee Experiment Station indicate that quality of tobacco grown in narrow strips places a

Inexpensive spray equipment is adequate for treating tobacco grown in narrow strips.

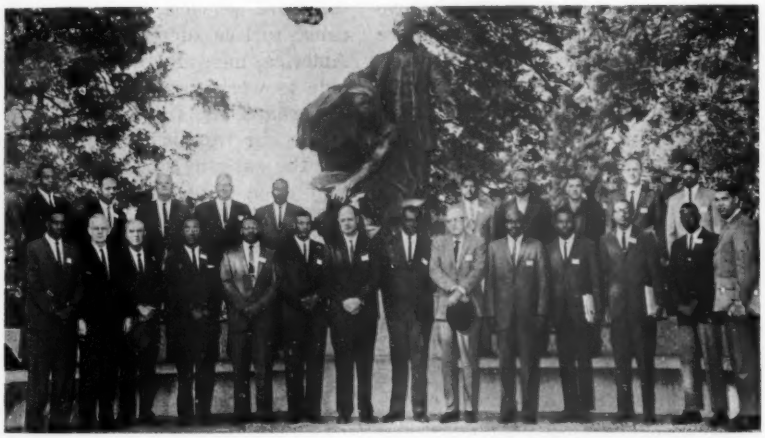
larger percentage of the crop in higher price grades than tobacco grown in a solid block.

The report also indicates a slight increase in yield from tobacco grown in narrow strips, due mainly to reduction in leaf droppage.

Grass seed can be harvested from the grass strips or used for hay. Good yields are produced because of the high rate of fertilizing the preceding tobacco crop.

Tobacco is usually harvested during the last half of August or in early September in Kentucky. This makes it possible to seed an early winter cover crop on the tobacco strips. Kentucky 31 tall fescue seeded immediately after tobacco harvest, at the rate of 40 to 50 pounds an acre, and field bromegrass seeded at 15 pounds an acre, are gaining favor as winter cover crops. ♦

## SCSers at Tuskegee Meeting



SCS representatives attending the annual conference of Professional Agricultural Workers Conference at Tuskagee Institute, Alabama, were: Front row from left—Samuel Combs, Jr., McAlester, Okla.; Carl Lindstrom, Washington, D. C.; J. A. Wilson, Wetumpka, Ala.; Howard J. Hardy, Aiken, S. C.; Plater T. Campbell, Haddam, Conn.; Haney Green, Opelousas, La.; James F. Hughes, Washington, D. C.; Obie L. Masingale, Nashville, Tenn.; L. L. McLemore, Jackson, Miss.; Dr. William H. Farley, Lewiston, Pa.; Alonzo Davis, Hinesville, Ga.; Jimmie K. Simpson, Ft. Worth, Tex.; Theodore Johnson, Jr., Gainesville, Fla.; Robert Williams, L'Anse, Mich. Back row—Joseph C. McKinney, Staunton, Va.; Otis N. Thompson, Washington, D. C.; Albert P. Boyd, Marianna, Fla.; S. W. Avera, Jr., Columbus, Ga.; Willie M. Moore, Fayetteville, Tenn.; Leonard Hardy, Jr., Edenton, N. C.; Thomas H. Baskins, Helena, Ark.; Ezell McLaurin, Jackson, Miss.; Billy F. Headden, Somerville, Tenn.; John E. Cowherd, Columbus, Ohio.

Twenty-four employees of the Soil Conservation Service attended the 23d annual conference of Professional Agricultural Workers Association at Tuskegee Institute in Alabama in December where Federal, State, and local representatives met to review their roles in the war on poverty.

SCSers from 11 States and the District of Columbia participated in the 3-day meeting with some 100 agricultural workers from other Federal and State agencies.

The conference program included speakers from the Department of Agriculture; Department of Labor; Department of Health, Education, and Welfare; and the Office of Economic Opportunity on the theme, "Involving the Whole Community and Local Government Agencies in Attacking the Problem of the Disadvantaged."

James F. Hughes, special assistant to the SCS Administrator on Inter-Group Relations, presided at one of the conference sessions. ♦

## Special ACP Practice for Critical Areas

A special practice in the Agricultural Conservation Program in Utah offers ranch operators cost-sharing for "rehabilitation of small critical areas of rangeland which are subject to severe sheet and gully erosion," when fully treated in accordance with a plan approved by the SCS technician and ASCS county committee.

Provisions for the practice were worked out jointly by ASCS, SCS, and the soil and water conservation districts of Utah. It illustrates an interagency approach that could be applied to especially troublesome problems in any land use — cropland, range, pasture, woodland, or wildlife or recreation areas.

The special practice requires (1) a plan for the area, (2) all needed practices for total treatment, (3) provision that all structural and cultural practices be installed during the first 2 years, (4) provision for protection and management for 5 years, and (5) cost-sharing on the total job.

Authorized cost-sharing ranges up to 75 percent of cost for specified operations that might be needed, such as fencing, seeding, earthmoving, and the like. ♦

## Recreation Developed in Watershed Projects

Ninety recreation developments in 76 small watershed projects in 30 States have been approved for technical and financial assistance since enabling legislation was enacted in late 1962. Forty-two of these were approved during 1965.

The developments will create 23,000 acres of surface water for recreation and provide other recreation facilities on adjacent lands. Most of the lakes in the developments will range from 100 to 800 acres.

It is estimated that about 4.7 million visitors annually will use the recreation developments. ♦

# Full Employment for Resources

By Orville L. Freeman

THIS is your 20th annual convention.

There is another 20th anniversary associated with February of 1966.

I believe there is a relationship between the two that goes beyond a mere coincidence of dates.

This month marks the 20th anniversary of the signing of what A. A. Berle has described as "a basic provision in the constitutional law of the American economic republic"—the Full Employment Act of 1946 . . .

When the Full Employment Act was being debated 20 years ago, who dared to imagine that within two decades our private enterprise system—with resources added by Government when needed—would bring us to the doorway of a trillion-dollar economy?

But, 20 years ago, in the first convention of the National Association of Soil Conservation Districts, who dared imagine that in 1966 we would be well on the way to adapting the full employment guideline to natural resources as well as the economy?

Who thought then that recreation could become a crop more valuable to many a landowner and consumer than corn; that a golf course or lake could serve a community better than a field of cotton?

Who thought then that the resources of rural America could be shaped to make an excellent home for industry and business as well as support an ever-improving agriculture?

Who thought then that districts would be considering today a series of proposals to apply their skills in conservation planning and practices to the broad range of natural resource uses essential to community development?

Thus we come closer to a true understanding of conservation. When wise use of natural resources is combined with the programs of health and education to improve human resources, we see more clearly that conservation is concerned not with nature alone but with the total relation between man and the world around him. The objective is to raise the quality of life and to give it new dimension.

If we have the will we can be well on the way to reaching maximum multiple utilization of the great resources of rural America by the time we reach a trillion-dollar economy.

The record of resource conservation-development-use of the last half dozen years can be favorably compared to the economic growth record. Soil and water conservation districts have had either leadership or supporting roles in most of it. We must now make sure that the record of the next 5 years is just as good . . .

We can well question the advisability of achieving a trillion-dollar economy if we get it at the cost of increased pollution of air and water; increased pollution of the social and cultural lives of human beings resulting from piling up too many of them in too few cities; increased congestion in everything from traffic to kindergarten classrooms.

For the well-being of the whole of the Nation—urban and rural—the greatest contribution that rural leadership can make to our generation is to make it possible for people to live rich and rewarding lives where the space is—on the countryside.

That space must, of course, be equipped with adequate educational and health services, water distribution and sanitation systems, facilities for job training, social services. And it must be marked by more industries, more businesses, more service institutions, because to live successfully in rural America, men and women must be able to work there.

Perhaps the fastest way to describe our task is that of rebuilding the gates of rural American so they open *in* as well as *out*.

This you can do. And the doing is filled with excitement and challenge. ♦

From remarks before the 20th annual convention of the National Association of Soil and Water Conservation Districts at New Orleans, February 8, delivered for the Secretary of Agriculture by Under Secretary John A. Schnittker.

## NACD for Broader District Action

BROADER programs and responsibilities for local conservation districts are the goal of actions taken by the National Association of Soil and Water Conservation Districts (NACD) at its twentieth annual convention in New Orleans in February.

The Association adopted resolutions endorsing the report of its Special Committee on District Outlook, released at the convention.

The report, *The Future of Districts,* culminates a 2-year review under the chairmanship of John Wilder of Tennessee of resource conservation programs in the United States.

In brief, it recommends that districts should no longer limit their activities to "soil and water" conservation nor to agricultural interests.

Rather, the administrative ma-

chinery and experienced leadership built up through 30 years of dealing with farm and ranch conservation problems should be applied to the entire range of natural resources to serve the needs of the Nation's entire population.

The report recognizes that changes in legislation would be needed in most States to enable districts to operate effectively in such a broad field.

The resolutions pledge NACD to offer assistance to conservation districts "in bringing about desirable amendments to State enabling laws, adopting improved operating policies, and securing needed assistance from governmental agencies."

The position of the association is in agreement with that of the Department of Agriculture expressed by Secretary Orville L. Freeman at the 1962 NACD convention when he invited districts to enter into revised Memorandums of Understanding covering broadened programs of resource conservation. To date more than 2,000 individual districts have modernized their programs and signed new agreements with the Department. ♦

**CONSERVATION PROFILE**

## *Elmer E. Peterson*

**Oregon**

### Country life not secluded for conservation winner

THE MAN who said, "If you want to live a secluded life, move to the country," certainly wasn't talking to Elmer E. Peterson of Sauvie Island in the Columbia River at Portland, Oreg.

Even living on an island isn't far enough removed for him to be forgotten by his fellow conservationists who recently saw him named by the National Wildlife Federation as Soil Conservationist of the Year for 1965.

A native Oregonian, Mr. Peterson has lived on Sauvie Island since he was 8 years old. The son of a dairyman, he grew up on a farm where he learned conservation at an early age.

He became even more involved in soil conservation in 1947 when he was elected to the board of

supervisors of the Sauvie Island Soil Conservation District.

### Top dairy farmer

A top dairy farmer and conservationist in his own right, Peterson carried out most of the practices in his conservation farm plan. For most men, operating a dairy farm would be a full-time job. But Peterson finds time also to serve as a district supervisor, a position he has held for 16 years. He is currently district secretary and has served several terms as chairman.

He also is a director of the Columbia Drainage District, which has developed a drainage plan for the area in cooperation with local, State, and Federal agencies.

He has served as an area director of the Oregon Association of Soil and Water Conservation Districts for 10 years and is serving his eighth year as president of the OSC&WD. As president, Peterson has been instrumental in working for enactment of legislation that has furthered the soil and water conservation program in Oregon. He also has developed soil judging and speaking contests for high schools in Oregon. And, he has been the prime mover in development of newsletters, folders, and brochures on soil conservation and related subjects to publicize the work of the association.

Elmer Peterson led the movement to secure the National Association of Soil and Water Conservation Districts' annual meeting for Portland in 1965. He served as local arrangements chairman for the gathering that brought 1,500 soil and water conservationists from all parts of the United States to Oregon.

### NACD director

Peterson was selected recently by his fellow district supervisors as a director from the West to serve on the board of the National Association of Soil and Water Conservation Districts. He also is on NACD's Finance and Shore Erosion committees.

In 1965 he was appointed to the State Soil and Water Conservation Committee of Oregon.

Recently, he journeyed to Alaska to help develop and organize an association of soil conservation districts for that State.

He is a member of the Soil Conservation Society of Amercia. He has served as a member of the Sauvie Island School Board for many years.

In January, this year, he made a trip to Washington, D. C., to receive 1 of 10 national awards in natural resources made by the National Wildlife Federation and the Sears Roebuck Foundation. ♦

# Districts Help Heal Mine Spoil in Appalachia

MORE THAN 3,400 private landowners received help from soil conservation districts in applying treatment on strip mine spoil areas in the 12 Appalachian States, a survey by the Soil Conservation Service shows.

SCS Administrator D. A. Williams, in October 1965, asked for a report on the application of land treatment in Appalachia. The survey was made on privately owned lands surface mined for coal, clay, sand, and gravel.

In a 5-year period from 1960-64, 177 districts assisted in treatment of spoil on 85,000 acres.

In addition to technical assistance provided by SCS in designing conservation practices, the districts contracted to do the total installation job for about 25 percent of the cooperators. Districts furnished needed equipment for another 20 percent of landowners who did their own jobs.

Trees were planted on 2 of each 3 acres treated. Other practices developed include wildlife and recreation on 14 percent, pastures on 12 percent, and 6 percent was equally divided between land cultivation and building sites.

Nearly 500 water-control structures—dams, spillways, drop structures—were installed.

Treatment costs per acre varied from $2 to $6,000—from tree planting to residential subdivisions.

The 1965 Appalachian Regional Development Act authorized the Secretary of Interior to make a comprehensive strip mine study and survey of the region by 1966.—T. B. PLAIR, *Woodland Conservationist, SCS, Washington, D.C.* ♦

Ponds yield the best fishing if they are built and managed primarily for fish production and fishing. ♦

**Soil Fertility and Fertilizers.** BY SAMUEL L. TISDALE AND NELSON L. WERNER. *1966. 2d ed. Macmillan Co., New York. 694 pp., illus. $12.50.*

This edition of a well-known text on fertilizers is more than a reprint of the first one. It is almost a complete revision. Many of the 17 chapters have been expanded. Each contains a good bibliography for use by college students and others who are interested in additional information. New chapters on efficient use of water, basic soil-plant relationships, and fertilizers have been added.

The information is well documented with fertilizer research results, most of which deal with the production of a few major crops. The subject of minor elements is well treated. There is, however, little attention given to the need and response of pastures to proper fertilization.

Four chapters — Fundamentals of Fertilizer Application, Cropping Systems and Soil Management, Economics of Lime and Fertilizer Use, and Fertilizers and Efficient Use of Water—are of particular interest to conservationists working with farmers.—B. D. BLAKELY, *Head Agronomist, SCS.*

## New Publications

**Natural Resources of Texas.** PREPARED BY U. S. DEPARTMENT OF THE INTERIOR. 1965. *With contributions from the Forest Service, the Public Health Service, the Soil Conservation Service, and the U. S. Army Corps of Engineers. 64 pp., illus. $0.45.* A beautifully illustrated booklet describing Texas' history, physical characteristics, fish and wildlife, water and power, forests, agriculture, minerals, parks and recreation opportunities, Indians, and programs of Federal natural resource agencies in the State.

The booklet is the 13th in an informational series on the natural resources of various States. It is however, the first one in which the work of the Soil Conservation Service has been discussed in the section on "Programs of Federal Natural Resource Agencies." Except for the few paragraphs contributed by SCS, this booklet, like the others, treats resource conservation as a function carried out by public agencies on public land. In Texas, Federal land accounts for 1.7 percent of the total.

The other Natural Resource booklets in the series published to date are on the States of Nevada, Massachusetts, Colorado, Arizona, Oregon, Ohio, Montana, Washington, New Mexico, West Virginia, Idaho, Utah.

**Snow Surveys.** BY ROBERT T. DAVIS. *1965. USDA Agr. Inf. Bul. 302. 16 pp., illus.* The bulletin tells how information on expected streamflow from snowmelt, probable high water along snowmelt streams, and depth and duration of snowpacks from previous years is obtained from measuring the snow on watersheds. Snow courses, snow sampling equipment, soil moisture stations, and the processing and release of water supply forecasts are described.

**Aquatic Pests on Irrigation Systems,** BY N. E. OTTO AND T. R. BARTLEY. *1965. Illustrated by D. W. Cunningham. U. S. Dept. of Interior. 72 pp., 30 color plates; pocket size. $1.75.* Full-page color illustrations provide a simple field guide to identification of 26 species or larger groups of aquatic plants and 4 kinds of invertebrate animals that often become pests in irrigation systems. Simple narrative descriptions supplement the drawings.

**Handbook of Agricultural Charts, 1965.** *1965. USDA Agr. Hdbk. 300. 159 pp., illus.* These charts give graphical data on the situation, commodity trends, foreign trade, marketing developments, population and rural development, and the family.

## Soil Surveys

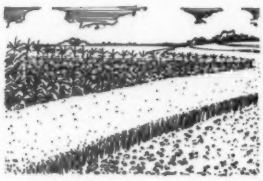
**Finney County, Kansas.** BY RODNEY F. HARNER, RAYMOND C. ANGELL, MARION A. LOBMEYER, AND DONALD R. JANTZ. *1965. 91 pp., illus; maps 3.17 inches to the mile (1:20,000).*

**Scott County, Kansas.** BY KENNETH H. SALLEE AND VERNON L. HAMILTON. *1965. 66 pp., illus.; maps 3.17 inches to the mile (1:20,000).*

**Morgan County, Georgia.** BY HARLEY H. PAYNE. *1965. 75 pp., illus; maps 4 inches to the mile (1:15,840).* Soils surveyed by Harley H. Payne and Jerry A. Pilkinton.

From the Administrator:

# *World Food and Soil Conservation*



THERE is every reason for nations of the world to take immediate action to conserve their soil and water resources to assure the continued and increased production of needed food and fiber.

In most countries population growth is creating critical pressures on available food lands. As I travel in various parts of the world, I am convinced that many nations must initiate drastic measures immediately to increase food production.

The First Pan American Soil Conservation Congress being held this month at Sao Paulo, Brazil, is an indication of the interest that countries of the Western Hemisphere have in the conservation of soil and water resources. Further evidence of such interest is the Third Session of the Food and Agriculture Organization's Working Party on Pasture and Fodder Development in Tropical America, also being held this month in Trinidad.

The Soil Conservation Service is actively cooperating with the Agency for International Development in providing technical assistance to many countries. Our contribution includes working with officials and technicians of each nation in organizing conservation programs and in training personnel to work with local people in applying conservation measures.

Technicians of the Soil Conservation Service who receive these assignments find them to be as challenging and rewarding as any of the home front. Through their experiences in many lands and the exchange of ideas with citizens of other countries, there is being built up a corps of international conservation workers competent to deal with the varied and complex resource problems of the free world.

Just such a development of professional conservation personnel had to take place in the United States before soil and water conservation could become an effective force in this country. The lessons learned here, both in principles of administration and in the fundamentals of resource use, now can be put to service in the wider arena of world affairs.

Certainly, conservation of soil and water is basic to rural development and a permanent productive agriculture in any country. Improved crop varieties, fertilization, insect and disease control, better harvesting methods, improved breeding and management of livestock, and more efficient marketing practices, important as they are, can give only temporary relief to the farmer or the nation that is losing productive soil at a dangerous rate.

Likewise, the prices obtained for agricultural commodities mean little to people who cannot produce enough food and fiber for home consumption because of soil impoverishment.

In many parts of the world, productive land and available water are limited. Productivity of much of the once good land has been reduced by erosion and misuse. There are vast areas in many countries that need fundamental changes in land use and the application of conservation treatments. Several of them, such as New Zealand, Thailand, and India, have enacted conservation legislation giving national emphasis to improving soil and water management.

Cultivated lands occupy only one-tenth of the land surface of the earth but they produce most of the food for mankind. Seventy percent of the harvested area is used to grow grain—a basic food which directly provides nearly half the calories for the world population.

Fertilizing is essential to increasing yields. In many areas, yields could be doubled or tripled with fertilizers and improved techniques that would reduce runoff and make use of available water.

Grasslands occupy about 20 percent of the world's land surface. Most of these areas are unsuited for the production of cultivated crops.

A large share of the total feed requirements for the world's livestock comes from these grazing lands. Chiefly because of poor management, in many parts of the world they are failing to contribute their share to production of food for animals and thus for man.

The management of these areas is of vital importance to sustained production. Work of such magnitude, particularly when it is widely dispersed, obviously cannot be accomplished to best advantage without a national policy of soil conservation, the teamwork of many minds, and correlated action on many fronts.

Such international meetings as the Pan American Soil Conservation Congress focus attention on conservation as the basis of world food production. They help to crystallize the growing body of knowledge in the new profession of soil conservation.

It is to be hoped that the Soil Conservation Congress will become a regular event, as have similar international meetings in such specialized fields as soils, forestry, grassland, and water management. Surely, soil and water conservation, which includes all these specialties, deserves an equal forum of international discussion.

D. A. WILLIAMS

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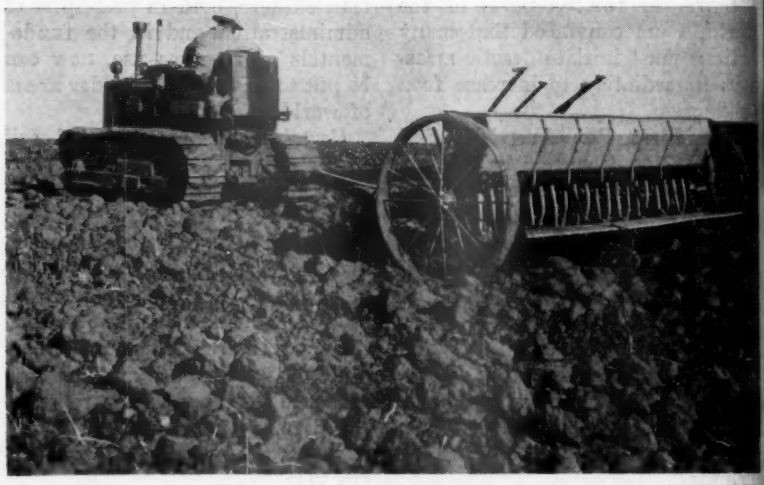
# Rough Tillage for Wheatland

ROUGH fall tillage is one conservation measure that all farmers can practice, says George Gault, wheat farmer in eastern Washington's Central Whitman Soil and Water Conservation District. And that's a boon to an area where farmers find it difficult to control erosion on irregular steep slopes.

It's easy to put a field in rough-clod shape, he says. A moldboard plow is all that is needed.

The soil must be dry, so plowing must be done before the fall rains come. Gault rough-plows his pea field right after harvest, then seeds the field to winter wheat with no other tillage before or after drilling. He points out that green manure should be plowed as late as possible so that the soil moisture is used up.

Rough fall tillage and minimum tillage go hand in hand, Gault says. Farmers who prepare a fine seedbed for winter grain can expect large erosion losses. A fine seedbed destroys the physical structure of the soil and breaks down soil organic matter faster, causing the soil to "puddle" with the first fall rains; some water soaks in, but most of it runs off and erodes the finely worked ground. In the rough-tilled soil, millions of tiny dams and ponds hold large amounts of water and check erosion, even on steep land.



The cloddy seedbed may make drilling difficult. But rough tillage eliminates two or three field operations, and the increased water absorption, soil aeration, and better soil bacteria activity more than offset this disadvantage, Gault says.

If a drill can't be used over the rough-tilled ground, wheat can be broadcast. — JUDD MELTON, *Soil Conservationist, SCS, Fairfield, Wash.* ♦

**Winter wheat is seeded on a field that was rough tilled following the harvest of a pea crop. Soil Conservationist Judd Melton (r.) checks Brevor White winter wheat crop planted on rough plowed ground.**